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Publication of The AMERICAN INSTITUTE of CHEMISTS

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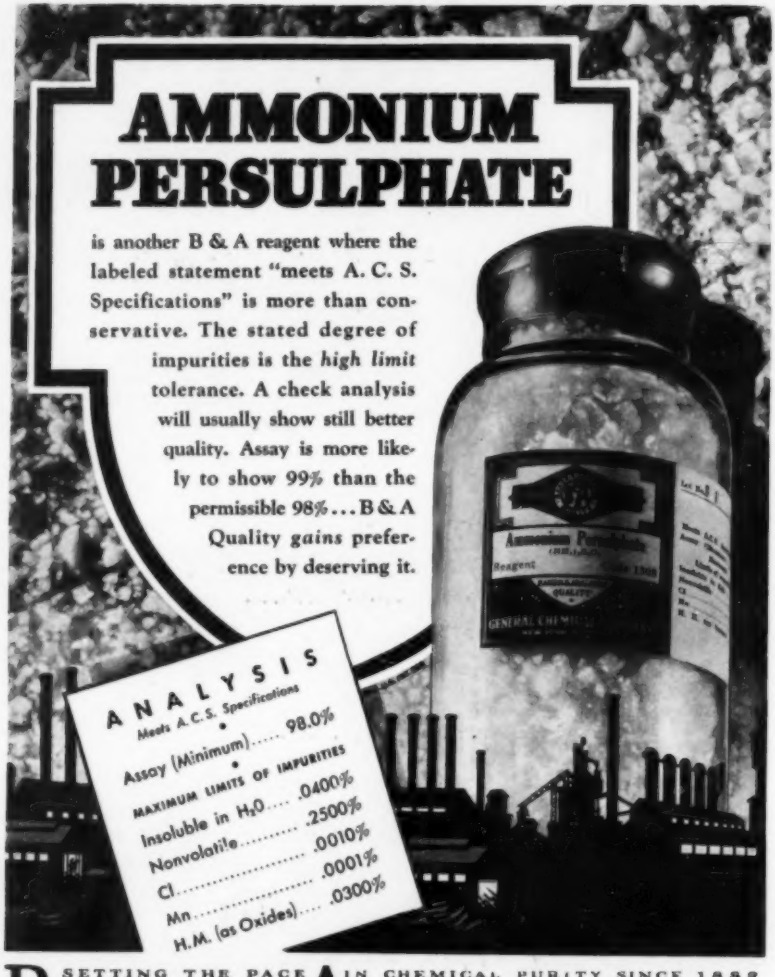

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The CHEMIST

Publication of

THE AMERICAN INSTITUTE OF CHEMISTS, INC.

ALAN PORTER LEE, F.A.I.C., *Editor*, 233 Broadway, New York City

VOLUME XI SEPTEMBER, 1934 NUMBER 6

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EDITORIAL

Trial by Depression

DURING the past five years most of us have been harassed by a multitude of new conditions and problems presented by an upset world. Many who believed their place in the scheme of things to be assured are now and have been for some time dependent for their very existence upon the aid of their more fortunate fellows. Those who have not been forced to accept such aid have, in many cases, kept their heads above water only by means of doubled or redoubled effort.

This unhappy state of affairs has been particularly noticeable in the chemical profession. Many industries and some units in all industries have cut their scientific staffs to the most rigid minimums. Many professors in our colleges and universities, as well as science teachers in our schools, have been forced to accept drastic salary reductions while others in many cases have gone unpaid for months on end. Our newest graduates have had no hope of finding work, in sharp contrast to former competition among employers for their services. Many laboratorians and consultants have seen their incomes dwindle to the vanishing point, and membership in all technical societies has fallen sharply.

As these disquieting words are written, however, the silver lining of the cloud seems to be approaching our view. A great automobile manufacturer (who should have access to the best sources of information concerning economic trends) has just announced that the depression is over. His increased production alone will give employment to many thousands, directly and indirectly, including, we hope, some chemists. Assuming his accuracy, let us pause, for a moment, at the beginning of our long-awaited upward swing, to examine the lessons of our tribulations.

The American Institute of Chemists has always favored and promoted solidarity in the profession of chemist. In the eyes of the Institute's founders and leaders, theirs is an honorable and ethical profession, entitled to recognition as such by scientist and layman alike. The Institute believes that the establishment and recognition of standards of education and experience for chemists will promote the welfare of qualified members of the profession and will help to close the door of opportunity to the unprincipled charlatan and the quack. The late depression *should* have taught us that the machinations of such as these strike at the very livelihood of the sincere chemist.

(*Turn to Page 166*)

The Outlook for the American Institute of Chemists

By Norman H. Shepard, F.A.I.C.

Address given at the American Institute of Chemists' luncheon, September 13, 1934, at Cleveland, Ohio, during the Cleveland meeting of the American Chemical Society.

AS I see the purposes of the A. I. C., from my short contact of less than five years, and from the constitution of the organization, they are briefly as follows:

To advance the profession of chemistry through:

(*a*) Insuring competent service in chemistry by: (1) establishing standards of conduct; (2) prescribing curricula of training; (3) licensing chemists.

(*b*) Appropriately recognizing distinguished service rendered by individual members of the profession.

(*c*) Improving the economic status of the chemist by: (1) promoting public recognition of the value of chemistry to mankind; (2) cooperating with employers, universities, industries, etc. (and "members" should be added to this list); (3) by exposing incompetency and fraud; (4) by legislation; (5) by cooperating with existing organizations (unfortunately cooperation has to exist on both sides).

In how far the Institute has progressed in accomplishing its goals cannot be discussed at length here. Considering its eleven years of existence, I am sure none of us is satisfied that the progress is all that could be desired. While an organization may not be solely judged by the number of its members, the roster of 763, after all these years, is not impressive. Nor is the increase of 4.1% from May, 1933, to May, 1934, indicative of any marked upward turn. While many distinguished names appear on the roll, many of our prominent American chemists have not seen fit to ally themselves with us. For instance, the name of none of the recipients of our Medal appears on the list, though they are, I am sure, heartily in favor of our aims and purposes. It is apparent to me that we have not sold the Institute in the large way that our worthy purposes should have enabled us to sell it. After more than ten years of continuance, chemists, to my knowledge, are not licensed in one single state. A code of ethics has been drafted but, with our modest

membership, it is questionable whether any marked influence has been had on the behavior of the rank and file of our chemists. We have worked diligently on establishing standards of minimum requisite training for the chemist, but I doubt that the impact on the universities has been perceptible.

LENGTHY discussion of the reasons for the present status of our organization would, I believe, be very profitable, and probably has been the major activity in many a council meeting. I can, however, take only a few minutes to mention some of these reasons. Furthermore, I am not so much interested in the past performance as I am, as my subject indicates, in the future.

The popular alibi for lack of progress in many fields of endeavor has been the depression. I consider "alibi" the proper word to use. The stress of our still continuing depression should have been, and should still be, a stimulus rather than a deterrent. It should put us into a fighting mood, rather than one of laissez faire.

It is easy to lay our lack of outstanding progress to our managing personnel. To do that is to lay the matter right back in our own laps. We have elected them. Furthermore, by and large, our officers deserve the greatest of praise. Against heavy odds, and a lethargic critical membership, they have toiled faithfully for us and the cause of chemists and chemistry. It seems to me that the situation in the majority of our churches offers a good analogy. Brilliant, faithful, and earnest ministers toil endlessly and ineffectively due to the inertia and inarticulateness of their so-called God-fearing congregations. I do not wish to infer that many of our members actually block, or attempt to block, the progress of the A. I. C., but, aside from a comparatively small group of our people, it seems to me that we have proved quite useless and ineffective. We have been selfishly looking more to our own interests and what we personally can get out of the Institute than to what we can give and accomplish for the Institute and Chemistry. Our work and ambition should be for our successors. It is altruistic endeavor for the bettering of conditions for the future chemist, as C. F. McKenna so aptly put it in the early days of the American Institute of Chemical Engineers (1908), rather than immediate benefit for ourselves that should and must motivate us if we are to be worthy of the title "Fellow of the American Institute of Chemists."

A word or two about the magnitude of the task before us, and the outlook. In a recent editorial[1] statistics were presented on the numbers of

[1] *Ind. Eng. Chem.*, **26**, 702 (July, 1934).

people in the various professions. Our profession, including assayers and metallurgists, was listed as having 37,068. (Incidentally the A. I. C. members are 2.06% of this.) In the same editorial it was estimated that there are now in our colleges and technical schools 30,000 majoring in chemistry. In other words, approximately 80% as many chemists are knocking at the door of our profession as are now listed in our profession. Isn't this a challenge for us to awake from our lethargy and help prepare the way for this enormous number of recruits? Of course, we all know that many of these will "fall by the wayside," but, suppose our institutions of learning are able to make 10,000 chemists from these 30,000 aspirants, it is appalling when we think of assimilating these into our profession during the next four years, especially when we realize the number of our now 37,000 who are still unemployed.

A FEW days ago I was asked by our secretary to serve on the membership committee. As usual, when such requests come to me, my first inclination is to lazily turn them down. This was the case when I was asked to give this talk. My better self finally came to the rescue and I accepted, and since then I have been doing some thinking as to what a forward step we could make if each of our members would pledge himself to bring in one new member this next year. The stimulus of a 100% increase in enrollment would be tremendous; the added income would enable us to do more effective work.

But why stop there? Could we not, through *real* effort, make an even greater showing in membership? There is one obstacle which I am sure is real and not imaginary and that is the amount of our assessment in annual dues. I believe this is too high, and I earnestly present to our council, for its consideration, the proposition of cutting our dues in half. I have done some work in recent years in an attempt to increase membership in our district, where we have so few members, and have always met with the dues as a serious obstacle. I have referred to the fact that even the chemist is cursed with selfishness and the question "what do I get for that amount of money?" is often asked. It is difficult for me to give a satisfying answer. Our house organ, "THE CHEMIST," in spite of its present quality, is not sufficient. Our meetings are few and far between. We offer no organized employment aid, and we have no outstanding record of accomplishment behind us. I offer for your consideration the following objectives:

(*Turn to Page 159*)

A New Technique in Teaching

By Thomas W. Davis, F.A.I.C.

Application of sound films to lectures and demonstrations opens new pathways for instruction in schools and colleges.

NO MAJOR change in the technique of school teaching has taken place during a period of two thousand years. Students still gather within sound of a teacher's voice; they listen; they discuss problems; and they perform assignments and have their work criticized and corrected. With the rapid development of numerous new mechanical arts during the nineteenth and twentieth centuries, it would indeed be surprising if we failed to find some device which can make easier the teacher's duties and improve the quality of instruction available to the student. Such a device seems to have been developed in the sound film. While sound film as an educational tool has many possibilities, we shall refer here to possible applications to collegiate instruction only.

There has been a gradual standardization of undergraduate instruction in American colleges during the past fifty years, and curricula are now fairly standardized in content if not in the quality of instruction. Classes have gradually been growing in size, but even yet sections with more than three hundred students are rare. With standard curricula, courses, too, have come to be standardized, and it has long been gossip among undergraduates that some of the instructors give the same material year after year—including the appropriate quips. The instructors, even the good ones, become repetitious phonographs. Part of this is due to the essential constancy of basic principles and purposes in a course, and part to the deadening effect of routine. Many teachers are conscious of this development in themselves; they recognize the unvarying character of their courses—especially the elementary ones—but the budgets do not allow getting fresh instructors every year or two and there has been no phonograph to assist them heretofore.

A beginning toward the liberation of educators has been made by the University of Chicago Press in cooperation with Erpi Picture Consultants, Inc. Several sound films in physical science have been prepared and more are projected. When sufficient experience has been gained with the existing film, there is no reason why the films should not

be extended to cover the full courses in physics, chemistry, and, indeed, in most of the elemental collegiate subjects. By extension of these films, the whole elementary curriculum can be given by the new technique. The conceivable economies are enormous. The finest lecturers would be used in preparation of the material, and by suitable rehearsals, the instructor could be caught permanently at his best. Techniques otherwise unavailable to teachers could be used. Experimental demonstrations could be shown in reels that would be impossible by any other means. Where demonstrations are not included in the material, the film could show the instructor during the process of his lectures. Diagrams and blackboard material could very easily be worked into the scheme. The sense of intimacy noted in commercial films when the actor looks at the audience assures us that in a film, a man can be as real as behind a lecture table—the personal touch need not be lost in the new type of instruction.

CLOSELY correlated with the material in the film and sound—on which a student would be required to keep notes—would be a syllabus to serve as a guide to proper emphasis. Parallel reading of texts would be expected, and also completion of such problems and other assignments as could readily be incorporated into the course. The attendance at film lectures would be a matter of hundreds rather than of dozens as for present classes, thus reducing importantly the building and instructor cost per student. The projector operator need not be a highly paid educator and he could work thirty or forty hours a week rather than fifteen or twenty, the normal maximum class room time for college instructors at the present time. Tests and periodic examinations would be left to the student, a formal examination coming only at the end of a student's course of study. A staff would be needed to supervise the preparation, revision, and projection of films, for checking attendance, grading examinations, and keeping records, but the teacher in the class room would become an instructor rather than a phonograph. His time would be given to conferences with students, and to advanced classes where the flux of material prevents sufficient standardization to justify the production of films. Released from the task of imparting factual knowledge, the instructor could devote himself to teaching methods and attitudes, in other words to student training in the broader sense. With the newer methods, there must be better personnel supervision of the students, better vocational guidance to forestall a student's wasting his time, and adequate safeguards to assure that a student will not shirk—but a system of rewards and penalties, a well-planned organi-

zation, and vocational advice should help in resolving the problem.

For language instruction, self-recordings would prove valuable in guiding a student, and in examining him. Laboratory instruction must continue necessarily under personal supervision, but elementary laboratory courses will probably be made optional. Considerable simplification and consolidation in laboratory instruction is already in evidence, and this probably will continue, as sound film comes increasingly into use.

If we object that the proposed schemes are cold and impersonal, we lose sight of the fact that people often seem more intimate and real when met in books, in story, and in film than in the flesh. If the proposed program means standardization, it means standardization on a high plane. Our increasing population necessarily requires a large degree of standardization. The new technique does not initiate the change but may accelerate it. Teachers should not lose sight of the fact that it is not the personality of the instructor, but that of the student, which is important. Our problem is to instruct our people in the most efficient way consonant with thoroughness, the method of instruction being secondary.

That sound film could probably be applied successfully to the teaching process is demonstrated by the influence of the "movies" on the thought of an average American community. One has but to watch an average group of children for a short time to realize how completely the "movies" affect their thinking and their attitudes. A large opportunity is being missed to begin and to continue the proper training of children through their "movies." The same influence, of course, continues though in a less obvious way even through adulthood, and there is no reason why the potentialities of sound film should not be utilized as an educational tool. Indeed, our centers of learning in the future may well be found in moving picture studios, and in theaters. The transition has been started, and competent teachers have nothing to fear from it.

Dr. A. Richard Bliss, Jr., Director of The Birmingham Research Laboratories and Professor of Pharmacology and Dean of the School of Pharmacy of Howard College (Birmingham, Alabama), was appointed Scientific Consultant to The United Medicine Manufacturers of America, Inc., by the Board of Directors of that body at their recent convention at The Waldorf Astoria.

Chemistry at the University of Alabama

By Jack P. Montgomery, F.A.I.C.

A review of the development of instruction in natural science at a great State Institution in the South.

CHEMISTRY teaching at the University of Alabama has been coexistent with the University, which is now in its one hundred and third year. For many years chemistry, geology, and mineralogy were handled in one department and the earlier professors enjoyed the combined title, "Professor of Chemistry and Mineralogy." Many distinguished names are found in the list of those so entitled.

John F. Wallis served for the first three years, organizing the work and superintending the construction and equipment of the laboratory. It goes without saying that much of the equipment was imported from France and England. Both Dr. Eugene A. Smith and Dr. J. W. Mallet, who were at the University prior to the war between the States, stated that this equipment was beautiful and complete and bore unmistakable signs of the Davy influence. When the University was burned by Federal troops in 1865, Dr. Mallet considered the loss of the contents of the chemical laboratory a serious blow to chemical history and antiquities, as many of the articles had become prized relics. Professor R. T. Brumby, who succeeded Wallis in 1834 and served for fifteen years, was well known as a geologist as well as a chemist. When in 1846 Sir Charles Lyell visited Alabama, Brumby was of great assistance to him. Later Lyell wrote, "It would have been impossible for me to form more than a conjectural opinion respecting the structure of the Warrier Coal Field had not the subject been previously studied with great care and scientific ability by Mr. Brumby."

The great F. A. P. Barnard, who later was the founder of Barnard College of Columbia University, became Professor of Mathematics, Natural Philosophy, and Astronomy in 1837, but in 1849 he succeeded Brumby. His new title was "Professor of Chemistry and Natural History," which Brumby had enjoyed since 1847 when Michael Tuomey, of South Carolina, came to the University as Professor of Geology and Mineralogy. Thus for a period of seven years, from 1847 to 1854, chemistry and geology were taught in separate departments. Dr.

Barnard had built an observatory and for many years it housed the largest telescope and the most important instruments to be found in the South. His interest in astronomy continued while he was teaching chemistry, and astronomy was, in effect, a part of the course in chemistry. If only spectroscopy had been developed sooner, what researches might have been announced by this astronomer-chemist! Incidentally, through the efforts of Dr. Barnard a chapter of Phi Beta Kappa was established, being number 12, and that is why promising students in chemistry who still, now and then, win the coveted honor wear the key so proudly.

IN 1856 Tuomey, who was the first State Geologist, succeeded Barnard and once again chemistry and geology were merged for a brief period. During that year, however, the brilliant J. W. Mallet was added to the staff and became the first "Professor of Chemistry," Tuomey then devoting all his time to his duties as State Geologist and Professor of Geology. Mallet had taken his bachelor's degree at the University of Dublin and had then become a student of Wöhler at Göttingen where he won his doctorate. There he met Clarke of Amherst and was persuaded to come to America. After one year at Amherst he came to Alabama where he remained until 1860 when he entered the Confederate Ordnance Service. It is said that he made unusually effective gunpowder. After the war he held professorships of short duration at the University of Texas and at Tulane University and then served the University of Virginia for more than a third of a century. He was one of the founders of the American Chemical Society and at one time its president. It is of interest that the first atomic weight determination in America, that of lithium, was made by Mallet at the University of Alabama in 1856, the results being published that year in Silliman's Journal. His value of 6.96 was raised to above 7 a few years later, but it is notable that the present value is 6.94. When Dr. Mallet joined the Confederate forces he was succeeded by Captain Caleb Huse, formerly of the United States Army, who was also Commandant and Professor of Military Science. Captain Huse was ably assisted in both phases of his work by the young Eugene A. Smith who much later became Professor of Chemistry, in the meantime serving in the Confederate army, then taking his Ph.D. at Heidelberg under Bunsen. After a very short term Captain Huse became the confidential agent of the Confederacy in Europe and William L. Boggs taught chemistry at Alabama for two years. During the later war period and until the burning of the University Dr. Warfield C. Richardson was Pro-

fessor of Chemistry. His great versatility is evident when it is recalled that at various times he occupied the chairs of Greek and of English, that he was a poet of note, and for a long period the President of the Tuscaloosa Female College.

The University did not reopen after the burning until 1871. Dr. Eugene A. Smith became Professor of Geology and Mineralogy. Until 1874 the President of the University, Dr. Nathaniel P. Lupton, taught the chemistry class and was the only Professor of Chemistry who had no laboratory whatever. In 1874 chemistry was again merged with geology under Dr. Smith and for a few years the laboratory work was done in the dark basement of the one University building.

NO NAME is better known in Alabama than that of Eugene A. Smith who for so many years performed in an inspiring manner the double duties of Professor of Chemistry and Geology throughout the University term, then during the long summers traveled with his team and wagon over the State, settling with a leisurely thoroughness the boundaries of the geological formations and amassing data for reports on the basis of which the mineral wealth of the State was exploited. His old Concord wagon is now a prized relic in the Alabama Museum of Natural History. Under his activity as Professor and as State Geologist a new Chemistry Building was erected about 1880. For its time this building was complete and up to date. Dr. J. M. Francis, who was later associated with Parke, Davis and Co. for so many years, was added to the faculty about this period, and shortly after that Dr. Smith began to give all his time to geology in which field he worked tirelessly as Professor and as State Geologist until his death in 1927.

After the retirement of Dr. Francis in 1892 Dr. J. M. Pickell served for six years, Professor Augustus Persons for eleven, and B. F. Lovelace, later of the Johns Hopkins Faculty, who is remembered for his work on silica gel, for three. Under Dr. Lovelace began the expansion of the department, which had previously been practically a one-man affair. As will be seen from the foregoing, the department had been for many years closely associated with geology. Beginning about 1910 contact was made more and more with developmental affairs. It seems quite fitting that a department interested for so many years in the discovery and classification of natural resources should now turn its efforts, in part at least, to the utilization of those resources while at the same time carrying on instructional work of a high grade. Chemical engineering was established in 1911, and courses in metallurgy were in-

troduced. Later metallography was added and then ceramics. The latest addition is chemical bacteriology.

This expansion in technical courses has been paralleled by increases in other lines more purely academic. The great growth of pre-medical courses, the increase of interest in home economics among the women students, the demands of the College of Education, and the desire of the students from the College of Arts and Sciences to take chemistry courses have all been effective in making the department grow, so that at present nine professors and many student instructors have their hands full with the work.

THE great expansion led in 1929 to the organization of the School of Chemistry, Metallurgy, and Ceramics, this University having the distinction of setting a precedent in this arrangement. Realizing that the time has passed for the profligate use and waste of raw materials and that we are more than ever called upon to work up to a higher complexity the wealth of raw materials of the State, the new school was organized to meet the increasing need. Since in Alabama this need is great in all three lines, chemical, metallurgical, and ceramic, greater perhaps than in other branches of technology, they were grouped together. Through smoothly working interlocking arrangements Dr. Stewart J. Lloyd, the Dean of the School, is also Professor of Chemistry and Chemical Engineering. He is the administrative head of the School and at the same time a member of the faculties of the College of Arts and Sciences and of the College of Engineering. The Department of Chemistry, as a department, receives students from all the non-professional schools and colleges of the University, but the School of Chemistry, Metallurgy, and Ceramics has the administration of the affairs of its own registrants only.

Until about fifteen years ago Tuomey Hall, the building erected by Dr. Eugene A. Smith, was adequate for the Department of Chemistry although some crowding was necessary. Then the expansion became so rapid that space was borrowed in other buildings and at one time classes and laboratory exercises were being held at five different locations. Relief from this situation came in 1926 when the present "New Laboratory" was constructed. It is a concrete-hollow tile structure with outside walls of brick trimmed with Alabama limestone. Built on the unit plan, an additional wing was erected two years ago. In using the building two outstanding policies have been observed, giving the students in elementary courses the best in location of laboratories and equipment, and opening the library during all working hours to all students. The

library is well supplied with both bound and current journals and is much used. It is probably the only departmental library which is not under lock and key.

In organization and teaching duties a very flexible plan is followed. As was mentioned above, Dean Lloyd of the School is also Professor of Chemistry and Chemical Engineering. Another member of the Staff is adviser to students in Engineering and maintains contact with the Dean of the College of Engineering. Another does the same service for students in Home Economics. A third is responsible for the pre-medical courses, students in which are of the College of Arts and Sciences. The Dean and the Professors of Metallurgy and of Ceramics maintain the most valuable contacts with industry. Although all students in elementary chemistry use the same text they meet in sections according to courses. In the laboratory all receive the same basal training upon which is superimposed specific work thought to be suitable for the particular group. Qualitative analysis is given to all in the second semester of the first year. In organic chemistry there is the usual eight-semester-hour course for all except students in Home Economics, who have a four-hour special course. In addition, work is offered in qualitative organic, physical organic, and the chemistry of cellulose. Quantitative analysis is taught from two standpoints but in either case is considered of fundamental importance. Because of their peculiar needs, pre-medical students are given work which is largely volumetric in character. This is considered a special course. All other students in quantitative take the more orthodox course which, in the case of many students, is followed by an advanced course somewhat technical in character. The usual course in physical chemistry is open to all students who have had any of the quantitative courses, but it is followed in certain courses by advanced physical and electrochemistry. Metallurgy, metallography, and ceramics are developed largely along professional lines, but certain classes in metallurgy and in ceramics are open to the non-technical student. Chemical bacteriology, technical chemistry, technical reports, and other highly specific courses are at present limited according to program requirements. History of chemistry serves as a meeting ground of a very mixed group of widely diversified interests.

RESEARCH is pursued along three lines, cooperative, industrial, and scholastic. As an example of cooperative research the recent production of xylose from cottonseed hulls may be cited, the other cooperators being the Bureau of Standards, the Alabama Polytechnic Institute, and the Federal Phosphorus Company. Indus-

trial research is of the usual type for which certain corporations employ fellows, usually graduates, and has proven very stimulating and helpful. Scholastic research is in connection with theses for the Master's Degree and is growing in importance year by year.

Under the leadership of Dean Lloyd, chemistry at the University of Alabama is considered a necessary part of a broad education and even those students specializing in chemistry are fully aware that they must offer a well-balanced program, not only as to schedule but in performance. It has been well demonstrated that in the teaching of chemistry there is abundant opportunity to reinforce instruction received in mathematics, economics, history, and languages, particularly English. A slogan very familiar at Alabama is, "Correct English is quite as important as correct chemistry."

ADDRESSES WANTED

The office of the Secretary of the Institute desires to obtain the present addresses of the following members. Anyone able to assist the Secretary in this connection is requested to communicate with him at 233 Broadway, New York City.

Irvin Cole
formerly: 2331 Cambrelling Ave.
New York, N. Y.

Galen F. Hoffman
formerly: Juniata College
Huntingdon, Pa.

A. Willard Joyce
formerly: 351 E. 73rd Street
New York, N. Y.

Henry N. Keife
formerly: Calco Chemical Co.
Bound Brook, N. J.

John H. Kuesel
formerly: Rock County Hospital
Orangeburg, N. Y.

Casimiro Liotta
formerly: 330 Weirfield St.
Brooklyn, N. Y.

Harold E. Moore
formerly: 2292 Indiana Avenue
Columbus, Ohio

Miss Mary A. Rolland
formerly: 45 W. 11th St.
New York, N. Y.

Leopoldo G. Salazar
formerly: P. O. Box 161
Bound Brook, N. J.

Alvin W. Underkoffler
formerly: Juniata College
Huntingdon, Pa.

Nao Uyei
formerly: 3752 80th St.
Jackson Heights, N. Y.

Kenneth G. Watkins
William C. Watkins
formerly: 735 N. Tuxedo Avenue
Stockton, Calif.

Shellac

By B. H. Knight, F.A.I.C.

A short sketch covering the origin, preparation, marketing, processing, and uses of a highly prized natural resin.

IN MY professional and social contacts I have met a good many people, technically trained and otherwise, who do not know what shellac really is; so it is with the idea of correcting a false impression many people have that I shall attempt herein to set forth a brief outline on shellac—its origin, preparation for export, method of acceptance in the hands of the American importers, further processing, sale, uses, etc.

The term *shellac*, strictly speaking, is the name for a material which in reality is four stages removed, from the standpoint of preparation, from its crude source of origin. The raw material is the product resulting from the action of an insect on a tree. India is the chief producer of shellac, although small quantities also come from Indo-China and Siam. The trees generally used for the production of shellac are called "Host trees," and consist of about six different varieties, mostly of the hardwood or semi-hardwood type. There is some *wild* shellac, but for the most part shellac is cultivated.

The actual cycle of cultivated shellac production works out about in this way: After having selected the host trees for the new crop, the laborers cut portions of branches of the older crop just before the young insects have hatched out and swarmed, and affix them to strategic positions on the new host trees. The new brood in time then hatches out, emerges from the mass of resinous matter in which it had its origin, slowly spreads out over the small branches of the new host tree, finds a suitable spot, and inserts its probosces into the tender bark, thus ending its travels. In this connection it has been said that the average shellac insect is capable of only twelve feet of travel during its entire life. The brood as it swarms over the new tree is made up very largely of females with just enough males for future propagation. The male insect generates very little resin, and such as he makes is of inferior quality. The females start in to suck in the sap of the tree as soon as affixed and exude the resinous matter in which they very soon become entirely embedded. In the meanwhile they have become fecund, so that they are really

carrying on simultaneously the production of a crop of shellac, as well as of a new brood of insects. At the expiration of the resin-producing period, after the swarming of the new brood of insects, the old ones die, thus completing their life cycle. There are from two to three such cycles a year, dependent upon local conditions.

WHEN the shellac is ready to harvest, the small branches, which now have a solid incrustation of resin on them, are broken off, and submitted to a flailing and winnowing operation which gets rid of the major portions of the actual branches and bark, leaving a dark colored material known commercially as sticklac, the material which is the basic starting point for all forms of manufactured shellac. This sticklac is a mixture of woody matter, extraneous inorganic matter, shellac, shellac wax, and shellac dye, the last-named material being an inherent ingredient of all sticklac, and the ingredient which was at one time the more valuable one, being used extensively as a red dye. I have read that the famous old "RED COAT" of the British army was formerly dyed with this material. Since the advent of chemical dyes, the use of this material as a dyestuff has gradually declined, so that today it is regarded merely as an impurity to be gotten rid of, its presence in finished shellac being undesirable.

Having already covered the first operation in the preparation of shellac we now proceed to the second operation which consists of treating the sticklac with successive portions of water to dissolve out the red dye. This washing operation is accompanied generally by a treading operation in order to reduce the particle size of the sticklac, and facilitate the removal of the dye. After the dye has been removed, the washed material is dried to about 2% water content, and the resultant product is known as *seedlac*, this name being given to it because of the fact that in the washing operation the particle size has been reduced to that of a fairly uniform round particle suggesting a seed. Seedlac as such is exported to a considerable extent, especially to America, where it is used as the basic shellac material for the manufacture of bleached, or white shellac, a product which when made into a varnish through solution in alcohol, is what *shellac* means to many people.

From the shellac standpoint, however, seedlac is the raw material used for the manufacture of all the various grades of native shellac. This operation, as conducted by the natives, is rather crude as regards equipment, and depends for its success to a great measure upon the knowledge and skill of the workmen, being generally conducted by two men working together. The seedlac is placed in a long narrow bag of light canvas or

duck, the dimensions of the bag being about four inches in diameter and eight to twelve feet long. The two operators, working before a charcoal fire which has a smooth hearth, outdoors, with a man at each end of the bag, pass it back and forth before the fire until the seedlac is molten, whereupon the operators twist the ends of the bag in opposite directions, thus causing the molten resin to extrude through the mesh of the cloth. The exudate is allowed to fall on the smooth hearth in front of the fire, where it forms roughly in the form of a button. Some shellac is sold in this form, as button lac. The customary procedure, however, is to work up the still plastic material into shellac in the following manner: a single operator works the mass out into a square or rectangular shape, keeping it warm all the while, and working barefooted handles the mass in such a way as to get the two lower corners between his toes, whereupon by pulling on the two upper corners the whole mass is spread out into a relatively large, but very thin sheet. This sheet is now set aside and allowed to cool, then struck with a hammer, causing it to fly into small thin flakes, the form in which all of the standard grades of shellac, such as USSA, TN, Heart, Superfine, etc., are exported. Shellac thus produced consists essentially of resin and wax, the amount of wax present constituting about $4^1/_2\%$ of the shellac. The resinous portion, chemically speaking, consists mainly of aleuritic acid and its esters.

The greater portion of all shellac, including sticklac, seedlac, button lac, and shellac, imported into this country is brought in by members of the U. S. Shellac Importers' Association, an organization which by cooperative arrangement with the Calcutta Association has established definite standards for each grade of shellac material, to which each shipment must conform, as determined by the analysis of the official shellac analyst, whose findings are regarded as authoritative and final by both the American and Calcutta Associations. By this arrangement, together with a color inspection system maintained by the American Association, the quality of shellac is maintained, in that all substandard, off color, and excessive impurity lots tendered for delivery are either subjected to a cash penalty proportionate to the amount of excess impurities found, or else rejected, if the dereliction is too great.

THE shellac imported under the buying arrangement outlined above is either sold in its flake form to manufacturers in this country who make a good many different uses of it; such as felt hat stiffening; moulded insulation; moulded products of all sorts, such as phonograph records and grinding wheels; orange shellac varnish; cements such as

electric lamp base and linoleum; non-fouling ship's bottom paints, etc., or else it is converted into white, or bleached shellac.

This industry is on such a scale as to warrant an organization to itself, known as the American Bleached Shellac Manufacturers' Association. The greater portion of the white shellac manufactured in this country is produced and sold by the members of this Association, which has a strict code of ethics regarding the purity of shellac sold, and which has waged a very vigorous campaign against the gross adulteration of shellac which was prevalent until a very few years ago. This Association has drawn up a definite set of standards to which their product must conform, and any customer of theirs can have recourse to the services of an official shellac analyst to see that the individual Association member's product conforms to this set of specifications, with the assurance that any claims as to non-adherence to specification, which are handled in the officially prescribed manner, will be suitably adjusted.

The bleaching of shellac, in bare essentials, consists of the following operations: solution in a mild alkali, treatment to proper color with sodium hypochlorite, precipitation of the bleached shellac with a suitable acid, agglomeration and washing of the precipitated shellac, and drying to a maximum 6% moisture content. The product constitutes the article of commerce known as bleached, white, or bone-dry shellac, and is sold by the bleacher as such to the trade, or may be made into a varnish by solution in alcohol, and sold as such. This white shellac varnish is used very extensively as a wood finishing material in the furniture, piano, building, and flooring trades. Another product of the shellac bleacher known as refined shellac, which is sold either as the dry shellac or in varnish form, is widely used in the nitrocellulose lacquer and specialty finishing trades. This product is essentially the same basic material as the regular bone-dry shellac, except that the wax is removed, so that it gives a clear, transparent solution in alcohol instead of the milky, opaque solution of the regular bone-dry shellac.

SHELLAC is the only commercial resin dependent upon an insect for its production. It is, on acount of its peculiar properties, the most valuable of the natural alcohol-soluble resin. Shellac is peculiarly tough and elastic, in comparison with other alcohol-soluble resins. It does not powder in a mortar, or, when properly applied, gum up under sandpaper, and it is very resistant to abrasion, qualities which have warranted its almost universal use, over a long period of years, in the furniture finishing and flooring trades. It also possesses the property of polymerizing under heat, a reaction which can be hastened or intensified

by the addition of proper accelerators. This particular property, in conjunction with its great binding strength, has won its well-merited place in the moulded insulation and miscellaneous moulded products field. Chemically shellac is much more complex than I have previously indicated, and it has not as yet by any means been thoroughly investigated. The U. S. Shellac Importers' Association, by arrangement with the chemical department of one of the greater New York colleges, has for several years conducted a research program which has for its main purpose a better knowledge and understanding of shellac, with the idea of improving it and widening its uses. The progress of this research program has been made public from time to time by publication of papers in the American Chemical Society publications. There is also in India a Shellac Research Institute supported jointly by the Indian Government and the Indian Lac Association, which is directing its energies toward the improvement of shellac production by experiments in insect breeding, introduction of new host trees, scientific cultivation, protection against disease, and the like, and I understand that real progress is being made.

So shellac, a product of nature, known since antiquity, has been carried to science for improvement and betterment, that it may be rendered more fit to cope with the competition of modern synthetic resins.

OUTLOOK FOR THE INSTITUTE

(*Continued from Page 145*)

1. A 100% increase in membership.
2. A reduction in dues.
3. Regular meetings at least semi-annually for the discussion of our work and problems.
4. Some concerted effort to aid unemployed chemists to secure employment.

The aims and purposes of our organization are admirable. The field of endeavor is fertile and rapidly enlarging. The leadership and sincerity of our president is unquestioned. The goal is within sight if we will but grasp the opportunity and *individually* do our part.

Forward, F.A.I.C.

COMMITTEE REPORTS

Summaries of the Various Phases of the Institute's Activities as Reported to the 1934 Annual Meeting

Committee on Insurance

By M. L. Crossley, F.A.I.C., Chairman

THE Committee on Insurance respectfully reports as follows:

A plan for the establishment of a retirement income was submitted by the Equitable Life Assurance Society of the United States but the Committee could not accept it and recommends that the problem be given further study before a definite conclusion is reached.

By the above plan all active members of the American Institute of Chemists would have been eligible in three classes: Juniors, Associates, and Fellows, and by depositing monthly $10, $15, and $20 in the respective groups, they would have been privileged to purchase retirement income for their respective ages as illustrated by the following: The monthly deposit age 30 would have purchased in the first group: for women, retiring age 60, an income of $34.50 per month; for men, retiring age 65, $57.40. In the second group: for women, $51.86; for men, $86.17. In the third group: for women, $69; for men, $114.80.

Each member would receive his own contract from the Equitable and this contract would show his guaranteed income. The contract would permit the members in each group to deposit in addition to the minimum requirements, added amounts in multiples of $1 per month at the time of the original purchase of the contract. If a member elected to increase his deposits later, he could do so only in minimum amounts of $10 per month. The contract would provide for cash surrender values beginning at the end of the first year. The guaranteed income would be increased by the dividends, so that the actual income received, based on the present scale of dividends, would be increased about 25% above the guaranteed amount.

While the usual retirement age is specified as 65 for men and 60 for women and incomes in the outline are based on these ages, the contract would guarantee retirement income starting at any age from 50 to 70. The contract would be owned by the individual and controlled by him. In case of resignation from the American Institute of Chemists, the individual could continue his payments direct to the insurance com-

pany; or, provided the contract had been in force for a year or more, accept a paid-up annuity in proportion to what he had paid in; or, he could surrender his contract for a cash surrender value. In case the member died before reaching the age of retirement, the contract would provide a cash death benefit for the beneficiary, the amount increasing with the time the contract was in force. The Institute could arrange the plan so as to avoid any responsibility for the collection of the premiums. It would be possible to arrange for the premiums to be paid by the individual members direct to the home office of the Equitable each month.

While the contract would have as its main purpose life annuity, each member could choose between a straight life annuity and a refund annuity. In the first case the contract would cease with the death of the member. In the second case the contract would guarantee to the annuitant a definite income, starting at the retirement age, for the rest of his life and if the member should die before the principal was used up, the balance of the principal would be paid to his beneficiary.

The Committee was not satisfied that the plan offered members of the Institute anything other than the privilege of paying the premiums monthly and it is believed that further study of the situation should result in a better plan. It was also the hope of the Committee that some cooperative arrangement can be worked out in which the employer will pay part or all of the annuity premiums. We therefore suggest that the matter be carried forward for another year. A strong, representative committee should be appointed to study the situation and formulate a plan for the amortization of the chemist's professional investment and a means be provided of paying for it in the price of goods and service. This will require a statistical study to ascertain the basic facts of cost and application. We should strive to interest other technical men, in particular engineers, and get their cooperation. With a definite plan we should next strive to sell the principle to Industry and secure its acceptance. With this foundation prepared, we shall be in a position to put the plan into operation.

Committee on Relief

By Frank G. Breyer, F.A.I.C., Chairman

I AM glad to report that through the efforts of the Committee on Unemployment and Relief for Chemists and Chemical Engineers there are none of the profession at the present moment in want or distress.

The Committee has placed in jobs a great many more men this year than last. The compensation is still below what it should be but is getting better. The Committee continuously has in mind the danger that these unemployed constitute to the returns of the whole profession.

Much of the present greatly improved situation, as compared with 1932 and 1933, is due to the fact that governmental agencies (CWA, PWA, etc.) have cooperated with us sympathetically and effectively. We have also been fortunate in our cooperation with the employment and relief agencies of the engineering societies.

It is proposed that when this temporary emergency is removed to a greater extent than it is at the present time, the sponsoring societies for the Committee on Unemployment and Relief for Chemists and Chemical Engineers authorize the continuation of this committee with the idea of having a permanent office and agency where any chemist in trouble may go for advice and help at any time. The details of such a proposal are being worked out and will be submitted to the directors at some later meeting. Most other professions have some central help and welfare bureau which is available in an emergency, as the Red Cross is to the nation as a whole.

Private conversations with a great many chemists indicate that there will be very general support for such a movement. Its need has been clearly brought to our attention during this depression. The Institute should take a leading part in this proposed permanent organization, and it is the feeling and hope of your committee members that when the proper time comes the Institute will take the initiative. I recommend that the welfare and relief idea be stressed by the Institute more in the future than it has in the past.

Committee on Constitutional Review

By Lloyd Van Doren, F.A.I.C., Chairman

AS A RESULT of the work of your Committee on Constitutional Revision, certain changes relative to the Constitution and By-laws have been suggested and referred to the National Council. The suggested changes are those given under Institute Notes elsewhere in this issue of THE CHEMIST.

Committee on Licensing

By Walter J. Baëza, F.A.I.C., Chairman

THE Licensing Committee has drafted a bill which will provide for the licensing of chemists in New York State. This bill has been forwarded through the kind offices of Dr. Burwell to his representative, Senator Williams, who promises to introduce it at the next session of the Legislature.

The principal parts of this bill appoint a Board of Examiners to be nominated by the American Chemical Society, The American Electrochemical Society, The American Institute of Chemical Engineers, and The American Institute of Chemists, and selected by the Board of Regents of the State of New York. This Board of Examiners will have the right to license, revoke licenses, and review licenses for the practice of chemistry. The cost of a license will be $10 and $1 per annum for each person wishing to practise chemistry in the State of New York. The Board shall have the power to raise and amend the requirements for license, which at the moment require membership in The American Institute of Chemical Engineers, The American Institute of Chemists, or membership in an association requiring equivalent high standing; and it shall require a Bachelor of Science degree in chemistry or equivalent education and training.

The bill provides for penalties of fine or imprisonment or both for anyone practising chemistry without a license.

Committee on Ethics

By Frank G. Breyer, F.A.I.C., Chairman

THE Committee on Ethics have had but one question before them during the past year. That question was treated in, I think, a fair and constructive manner. The lesson derived from it was that a little more care should be given to applications for membership when unknown parties outside of the Institute are making recommendations. It is recommended that the members report promptly to the Committee on Ethics any matter detrimental to the ethics of the profession or the good name of any individual member thereof.

INSTITUTE NOTES

National Council

September Meeting

The one hundred and fourteenth meeting of the Council of The American Institute of Chemists was held at The Chemists' Club, 52 East 41st Street, New York, N. Y., on Thursday, September 20, 1934, at 6:30 o'clock, P. M.

President Dr. M. L. Crossley presided.

The following Councilors and Officers were present:

Messrs. Baker, Breyer, Burwell, Jackson, Knight, Neiman, Taggart, Zons, and Miss Wall. Mr. W. J. Baëza was present during the discussion of the proposed bill for licensing.

The minutes of the previous meeting were approved. In the absence of the Treasurer, the Secretary presented the Treasurer's report showing a cash balance as of September 15, 1934, of $1,437.17. Upon motion made and seconded, the Treasurer's report was accepted.

Dr. Burwell presented a letter from Dr. H. W. Post, Secretary of the Niagara Chapter, containing a number of suggestions, and the Secretary was directed to send forward a copy of this letter to each of the members of the Council. Dr. Burwell also presented a letter from Dr. Post, Secretary of the Niagara Chapter, commenting upon the bill for licensing, and the Secretary was directed to forward a copy of it to Mr. Baëza.

Dr. Baker reported on The American Institute of Chemists' luncheon at Cleveland, and the report was accepted with expressions of appreciation to Dr. Baker for his efficient service in this matter.

On motion made and seconded it was

Resolved, that the arrangements made with the Chapters for the collection of delinquent dues be extended to January 1, 1935, and that the Secretary so advise the Chapters.

In the absence of the Editor, the Secretary submitted the report of the Editor of THE CHEMIST, which upon motion made and seconded was adopted.

Miss Wall reported that it had not been possible to make a definite report for the Committee upon Chapter medals, and the President appointed Dr. Zons as an additional member upon this Committee.

The President appointed a Committee composed of Miss Calm M. Hoke and Dr. T. A. Wright to consider the possibility of a stationery emblem and to report at the next meeting.

The Secretary reported that the total membership was 760 members and that the payment of this year's dues was greater than that for the corresponding period last year.

The Secretary reported that the amendments to the Constitution, submitted to the members at the last annual meeting, had been adopted by majority vote of the membership.

Upon motion made and seconded, the roster of the Institute is to contain the names of those who have paid their dues for 1933–1934, and 1934–1935.

The question of the Licensing Bill was discussed in detail, and upon motion made and seconded, it was

Resolved, that it was the consensus of those present that we should have a licensing bill, and upon further motion made and seconded it was

Resolved, that the submitted bill be approved in principle. The bill was, therefore, returned to the Committee with power to act.

The Secretary was directed to write to Dr. Moody relative to codes not allowing one concern to engage a chemist associated with another concern.

The following new members were elected:

Fellows: Harold E. Dietrich, Chemical Engineer, Visking Corporation, 6733 W. 65th Street, Clearing Station, Chicago, Ill. Williamson Wade Moss, Jr., Director of Research, Beryllium Products Corp., Marysville, Mich.

Associate: James Allan Camelford, Chemist, Alox Chemical Corporation, P. O. Box 949, Niagara Falls, N. Y.

Junior: Abraham A. Pollock, 626 West Front Street, Plainfield, N. J.

Upon motion made and seconded, it was

Resolved, to hold the meetings of the Council on the third Thursday of each month.

The President appointed a Budget Committee consisting of Mr. Neiman and Dr. Zons.

The President revised the Membership Committee to consist as follows: R. A. Baker, A. W. Burwell, N. A. Shepard, W. J. Cotton, W. A. Hamor, D. D. Jackson, and J. F. Couch.

The Secretary read a letter from Dr. H. R. Moody to the effect that he is keeping in touch with the Deputy Administrator of the National Recovery Administration relative to codes affecting chemists.

A digest of the speech of Dr. Norman A. Shepard, delivered at the American Institute of Chemists' Luncheon at Cleveland, was presented, and upon motion made and seconded, it was referred to the Membership Committee to be reported upon by that Committee at the next meeting of the Council. There being no further business, adjournment was taken.

Letter to the Institute

Since the winter of 1931, the Committee on Unemployment and Relief for Chemists and Chemical Engineers at 300 Madison Avenue, New York City, which your association sponsored, received 1,400 applications of unemployed qualified chemists and chemical engineers residing in the greater metropolitan area. Of these, 315 secured permanent jobs, more than 300 were placed on temporary technical or non-technical work, and financial assistance was secured for 166 cases in desperate need. There are 426 unemployed chemists without jobs on the Committee's active file. Of these, the resources of 150 are nearly exhausted. Registration is increasing at the rate of about 30 a month.

It is needless to mention that this is a partial picture of the unemployment situation in the chemical industry. Your Committee, therefore, desires that every unemployed chemist or chemical engineer, residing in the greater metropolitan area, irrespective of his financial circumstances, should register with the Committee. Every employed member of the profession should help the Committee's efforts toward relieving distress to those in need. His financial assistance, supplemented by information regarding jobs available, is badly needed.

The members of the American Institute of Chemists should give their serious consideration to the unemployment problem.

Committee Appointments

M. L. Crossley, President, announces appointment of the following committees of the Institute for the year 1934–1935:

Professional Education: W. T. Taggart, A. J. Hill, C. A. Kraus.

Ethics: A. P. Sachs, E. F. Cayo, F. E. Wall.

Qualifications: H. S. Neiman, F. W. Zons, W. L. Prager, J. W. H. Randall.

Civil Service: Frederick Kenney, H. G. Byers, H. R. Moody.

Legislation: August Merz, A. F. Odell, H. S. Neiman.

Membership: W. T. Read, R. A. Baker, A. W. Burwell, N. A. Shepard, W. J. Cotton, W. A. Hamor, D. D. Jackson, J. F. Couch.

Constitutional Revision: L. VanDoren, F. E. Wall, K. M. Herstein.

Insurance: F. G. Breyer, G. M. J. MacKay, R. H. Kienle.

Representatives to Committee on Unemployment: W. J. Baëza, D. P. Morgan.

EDITORIAL

(*Continued from Page 142*)

Those few of our profession who have been so fortunate as to emerge unscathed from depression's siege will undoubtedly continue with new vigor their support of the Institute as an agency for the common good, while those who bear the scars of conflict will renew their allegiance, recognizing in the Institute's policy the strongest force battling against a recurrence of their recent difficulties.

BOOK REVIEWS

The Merck Manual, Sixth Edition. *Merck & Co. Inc.* Rahway, N. J.

This handy reference book, grown from less than 500 to over 1,400 pages, contains six sections. The first and largest, which is entitled Therapeutic Indications, contains a discussion of most common disorders and their treatment and a list of prescriptions commonly used. Its contents will therefore be of rather slight interest to the chemist except as purely illustrative of the actions of drugs. The other sections entitled Urinalysis, Poisoning and Its Treatment, Dose Table, Materia Medica, and Miscellany, contain in tabular form a great variety of information not readily accessible in the chemist's library. The usefulness of the information will, of course, vary with the special interests of the chemist-reader. However, this reviewer has on many occasions found the earlier editions of value, and has no hesitation in recommending this edition to anyone whose work may take him along pharmaceutical lines. K. M. H.

Annual Survey of American Chemistry. Vol. VIII. 1933. *The Chemical Catalog Co.* New York, N. Y.

Now that the Annual Survey is in its eighth year, there can no longer be any question of its firm basis. The research worker must have such a survey before him to keep him posted on the work being done in fields close to his own but which he cannot follow amid the enormous volume of our current periodical literature. To the chemical public as a whole there is no easier means of keeping abreast of the times. The subject and author indices and the references at the foot of each chapter serve as guides to reading in any of the fields covered by the book. It is a matter of regret that the limitations of the times compel rotation of the topics to be discussed in each annual issue. But this is much to be preferred to a solution of the financial problem which would permanently limit the number of topics or restrict the number of issues.

There are in the present volume twenty-five chapters, twelve of which cover topics in pure science and ten of which will be treated

annually. The remaining thirteen chapters are selected from various fields of applied chemistry. The editing of the volume by Dr. C. J. West represents a service to American Chemistry and Chemists which cannot be too highly appreciated. K. M. H.

Industrial Chemistry. By WILLIAM THORNTON READ, F.A.I.C. *John Wiley & Sons, Inc.*

There is one innovation in the volume which in itself more than justifies the entire work. This is a recognition that the human relationships of chemical industry play a part quite as important for the student as the material relationships.

The first six chapters of the book which deal with these human and economic relationships are excellently considered to bring about just that revolution in chemical education for which the Institute stands. They serve immediately to point out to the student that chemical industry is a field of human endeavor primarily, and only second to that is it a question of equipment, processes, and materials.

In his preface, Professor Read says, "The purpose of this book is to give an adequate and well-balanced picture of modern industries from the standpoint of chemical compounds and changes, chemical engineering operations, sources of raw materials, uses of products, and economic operations."

To comprise anything approaching an adequate treatment of all of these objects into less than six hundred pages requires either a great deal of omission or tremendous compression. Professor Read has preferred the latter method. Since he has had ample experience as a teacher, no one can question his choice. The volume is encyclopedic in scope. Detail has been well selected. Therefore, as it stands the book can well serve its purpose of an introductory text for students, and can equally well serve as a preliminary reference on any phase of the chemical industry. On both of these grounds the book deserves a place in the library of any recent graduate as well as in that of the older practitioner. K. M. H.

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